

# Project Fact Sheet

Fall / Winter 2011

## Caldecott Facts

Roughly 3/4 of the excavation was performed from the eastern end of the tunnel due in part to the fact that the Orinda Formation on the east side is less prone to fracturing.



## Safety During Construction

Safety is a top priority during construction. There are many safety measures in place to protect workers and the integrity of the tunnel during construction.



## FOR MORE INFORMATION

Community outreach to project neighbors and community and civic groups in Alameda and Contra Costa counties is important as the level of interest in the Fourth Bore mounts. For more information please visit:

**WEBSITE**  
[www.caldecott-tunnel.org](http://www.caldecott-tunnel.org)

**E-MAIL**  
[Ivy\\_Morrison@dot.ca.gov](mailto:Ivy_Morrison@dot.ca.gov)

## Tunnel Geology

Although sedimentary rock (the predominant kind of rock being excavated), is typically layered horizontally, due to the extensive tectonic movement in the Bay Area and finding of the layers, crews must tunnel through rock that has become almost vertical. This means rapidly changing ground conditions, which sequential excavation is ideally suited to address. The three primary rock formations that are traversed span the Miocene period, from 5 to 23 million years ago.

## Project Funding

The Caldecott Fourth Bore Project is comprised of four separate construction contracts: 1) Construction of the Caldecott Fourth Bore (by far the largest contract); 2) Realignment of the Westbound State Route 24-to-Northbound- State Route 13 Ramp; 3) Kay Street Improvements and 4) Highway Planting, which will be awarded towards the end of work on the project in 2014.

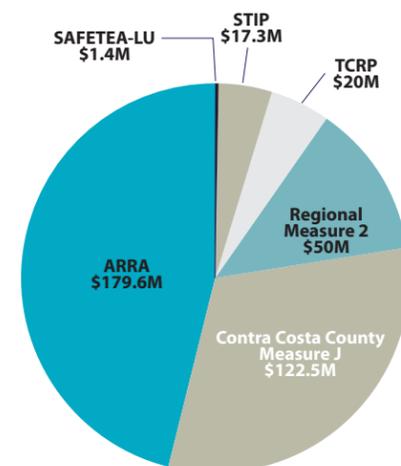
Originally, \$420 million was allocated to the Fourth Bore Project. Due to favorable market conditions and bid savings on the construction contracts, a portion of the federal funds were able to be deobligated from the project and made available to other projects in the state.

The current budget for design, administration and construction of the Fourth Bore Project is \$390.8 million.

The project received a much needed infusion of funds in 2009 from the American Recovery and Reinvestment Act. In fact, the Caldecott Fourth Bore Project is one of the largest recipients of Recovery Act funding in the nation – a true testament to the regional importance of this project.

Funds from Contra Costa County Measure J are the second largest source of funding for the project. Measure J was passed by voters in November 2004 and is a continuance of a half-cent sales tax to fund transportation projects. The availability of these local government funds was the impetus for obtaining additional funds from the federal, state and regional governments to fully fund the project.

Total Funding for Four Contracts (\$390.8M)



## Project Introduction

The Caldecott Fourth Bore Project represents a partnership between the Federal Highway Administration, the California Department of Transportation, the Metropolitan Transportation Commission, the Contra Costa Transportation Authority, and the Alameda County Transportation Commission to build a two-lane fourth tunnel bore north of the existing three Caldecott tunnels. When it opens to traffic in late 2013, it will provide congestion relief along a heavily traveled portion of State Route 24 between Alameda and Contra Costa counties.



## Major Project Milestone

The tunnel "breakthrough" – when the east and west sides of the tunnel meet – is a major project milestone. Breakthrough marks the complete excavation of the top portion, or topheading, and demonstrates the excellent progress the project has made since tunneling started. Excavation of the Fourth Bore began on the eastern side (Orinda) in August 2010 and on the western side (Oakland) in March 2011. The topheading was excavated first for efficiency and to maintain control of the surrounding rock.

## Details

A 130-ton roadheader excavating from the east side will "breakthrough" and complete the topheading excavation of the Caldecott Fourth Bore.

The breakthrough is anticipated to occur approximately 200 meters in from the western portal. In November, crews on the west side began excavating the tunnel's bench, or bottom portion, to allow crews on the east side to complete the excavation of the last portion of the Fourth Bore's topheading.

The breakthrough will occur in the Sobrante Formation (chert). A 130-ton roadheader excavating from the east side will do the dirty work (see interior for graphic). The breakthrough is anticipated to take approximately one full day to complete, including the installation of initial lining (shotcrete) once the roadheader penetrates the rock separating the two sides.

Following the breakthrough and removal of excavated rock, the roadheader will continue excavation of the bench, traveling from west to east.

The tunnel breakthrough is a significant accomplishment for this four-year, \$390.8 million project and brings the region one step closer to traffic congestion relief.

## Project Overview

The Caldecott Fourth Bore Project is comprised of four separate construction contracts. In addition to construction of the Fourth Bore itself, there are two smaller projects to enhance traffic flow in the vicinity of the tunnels, as well as a future project to landscape the area when the tunnel project is completed.

In addition, the project includes the following elements:

- Construction of retaining walls and portals at the new tunnel openings
- Temporary and permanent soundwalls on the west side
- Seven emergency cross passages between the third and fourth bores
- Demolition of the existing maintenance building and construction of a new two-story operations and maintenance building
- Installation of operations, communications and emergency systems
- Various roadway improvements

## Facts

Excavated Length: 990 meters (3,248 feet)

Project Began: January 2010

Anticipated Completion: 2014

Total Funding: \$390.8 million

Total Bid Amount (for construction): \$215 million

Traffic Lanes: Two 12-foot traffic lanes with two shoulders – 10 feet on the northern wall and 2 feet on the southern wall

### Tunnel Structure:

- The tunnel uses a double shell lining with a plastic waterproofing membrane separating the linings
- Volume of Shotcrete for Initial Lining: 19,732 cubic meters
- Volume of Concrete for Final Lining: 30,677 cubic meters
- Total Excavation Volume: 182,734 cubic meters
- Design Life: 75 years
- Seismic Design Criteria: 1500-year earthquake
- Designed as a lifeline structure to reopen to emergency vehicles within 72 hours after a major event

### Geologic Formations:

- Sobrante Formation – Marine Shale and Sandstone (Western End)
- Claremont Formation – Chert, Shale, and Sandstone (Middle)
- Orinda Formation – Non-marine Claystone, Siltstone, Sandstone, and Conglomerate (Eastern End)
- Four Major Faults and Three Minor Faults

### Tunnel dimensions:

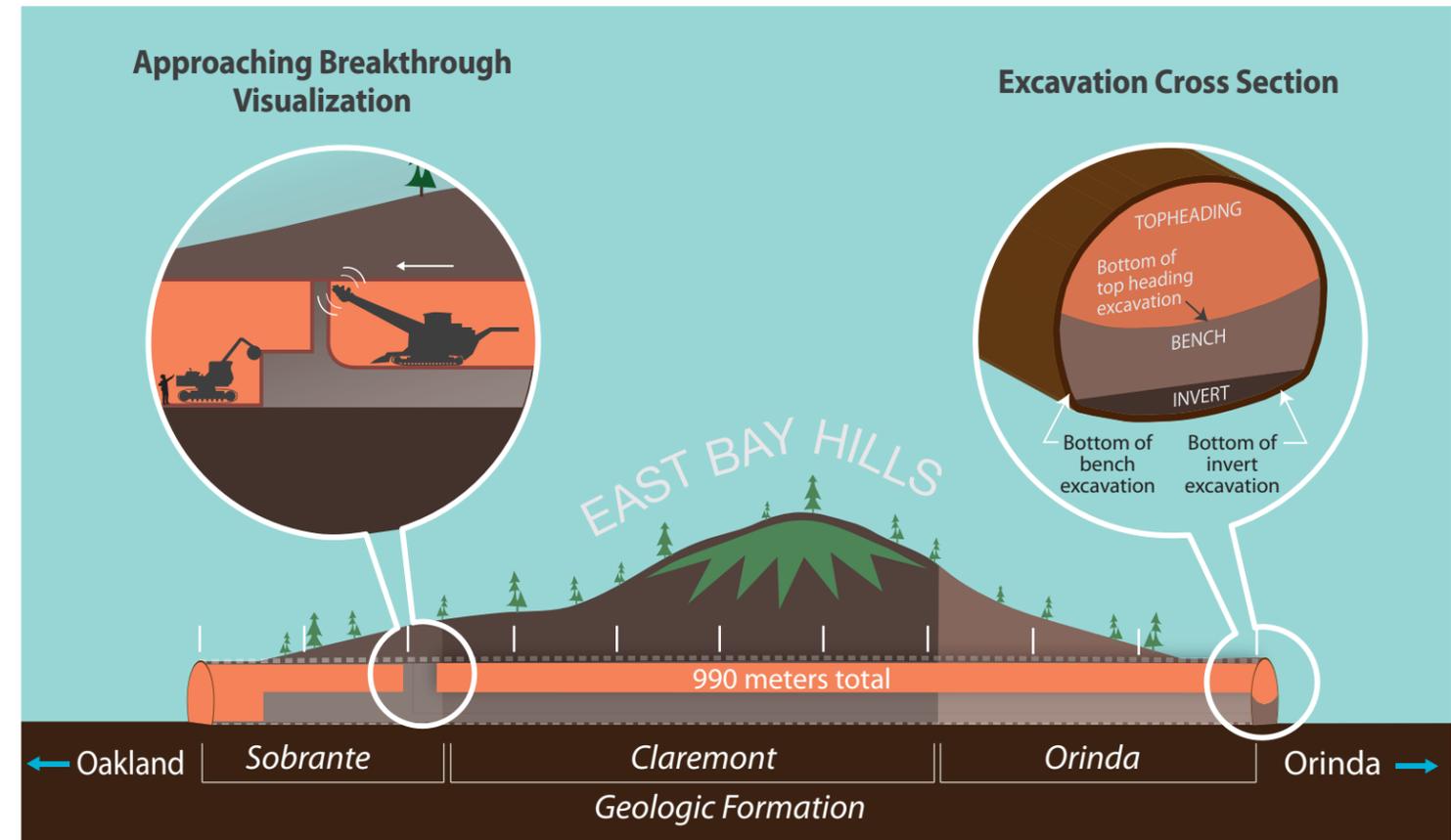
- Total excavated dimensions: 15 meters wide, 11 - 12.3 meters high
- Roadway clearance: 5.1 meters high
- Roadway paving: 735 millimeters thick

## Congestion Relief

State Route 24 currently carries about 160,000 vehicles a day through the three existing tunnels and traffic congestion is an ongoing problem.

The new Fourth Bore will relieve congestion in the off-peak direction by permanently dedicating two bores to westbound traffic and two to eastbound traffic.

This will eliminate the need to reverse the traffic direction in the center bore twice a day to accommodate morning and evening commute traffic.



## Construction Method

The Fourth Bore is being excavated using a Sequential Excavation Method. During tunneling, the installation of structural support is performed in sequence; each round of excavation is followed by the application of shotcrete (a concrete spray) and the installation of rock dowels. Sequential excavation enables engineers to continually monitor

and respond to the changing ground and rock conditions within the tunnel. Tunnel crews can make adjustments to the levels of structural support by varying the length of excavation, varying the thickness of the shotcrete lining or, in especially unstable areas, excavating an invert.

The California Division of Occupational Safety and Health classified the Fourth

Bore as gassy due to trace amounts of naturally occurring hydrocarbons. This classification requires the use of tunnel-safe equipment, including an electric-powered, 130-ton Wirth roadheader on the eastern end, a modified Caterpillar 330 excavator on the western end, a ventilation system to maintain air quality in the tunnel, and special safety training and equipment for tunneling crews.

## ROCK FORMATIONS



## PROJECT TIMELINE

2010

TOPHEADING TUNNELING FROM EAST

2011

TUNNELING FROM WEST

2012

COMPLETE ALL EXCAVATION

2013

OPEN TO TRAFFIC

2014

LANDSCAPING PROJECT BEGINS

GROUND BREAKING

BREAKTHROUGH